

Amendments to the Claims

This listing of claim will replace all prior versions and listings of claim in the application.

1)-6) (cancelled)

7) (currently amended) A phase locked loop circuit, comprising:

a phase-frequency detector to provide a phase difference signal in response to an input signal and a feedback signal;

a first charge-pump, coupled to the phase-frequency detector, to provide a first voltage in response to the phase difference signal;

a second charge pump, coupled to the phase-frequency detector, to provide a second voltage in response to the phase difference signal;

a loop resistor, coupled to the first charge-pump, to provide a buffered voltage responsive to the first voltage;

a voltage regulator, coupled to the loop resistor and the second charge pump, to provide a current in response to the buffered voltage and second voltage, wherein the voltage regulator includes a bias-generating device to provide a bias current;

a voltage-controlled oscillator, coupled to the voltage regulator, to provide the feedback signal in response to the current; and,

an interconnect, coupled to the voltage regulator, the first charge pump, and the second charge pump, to transfer the bias current,

wherein the bias-generating device in the voltage regulator is a MOSFET device,

wherein the MOSFET device is a first p-type transistor having a drain coupled to the interconnect and the first p-type transistor having a source coupled a voltage source,

wherein the voltage regulator includes:

a second p-type transistor having a gate coupled to a gate of the first p-type transistor and the second p-type transistor having a source coupled to the voltage source;

a third p-type transistor having a gate coupled to the gate of the second p-type transistor and the third p-type transistor having a source coupled to the voltage source;

a fourth p-type transistor having a gate coupled to the gate of the third p-type transistor

transistor and the fourth p-type transistor having a source coupled to the voltage source;
a fifth p-type transistor having a gate coupled to the gate of the fourth p-type transistor
and the fifth p-type transistor having a source coupled to the voltage source;
a first n-type transistor having a drain coupled to a drain of the second p-type transistor,
the first n-type transistor having a source coupled to ground and the first n-type transistor having
a gate coupled to the drain of the second p-type transistor;
a second n-type transistor having a drain coupled to a drain of the third p-type transistor,
the drain of the second n-type transistor coupled to the gate of the third p-type transistor and the
gate of the fourth p-type transistor, the second n-type transistor having a gate coupled to an input,
and the second n-type transistor having a source;
a third n-type transistor having a drain coupled to a drain of the fourth p-type transistor
and a drain of the fifth p-type transistor, the third n-type transistor having a gate coupled to an
output and the gate of the third n-type transistor coupled to the drain of the fourth p-type
transistor and the drain of the fifth p-type transistor, and the third n-type transistor having a
source; and,
a fourth n-type transistor having a drain coupled to the source of the second n-type
transistor and the source of the third n-type transistor, the fourth n-type transistor having a source
coupled to ground and the fourth n-type transistor having a gate coupled to the gate of the first n-
type transistor and the drain of the first n-type transistor.

8)-10) (cancelled)

11) (currently amended) A delay locked loop circuit, comprising:
 a phase detector to generate a phase difference signal in response to an input signal and a feedback signal;
 a charge-pump, coupled to the phase detector, to generate a voltage in response to the phase difference signal;
 a voltage regulator, coupled to the charge pump, to provide a current in response to the voltage, wherein the voltage regulator includes a bias-generating device to provide a bias current;
 a voltage-controlled delay line, coupled to the voltage regulator, to provide the feedback

feedback signal in response to the current; and,

an interconnect, coupled to the charge pump and the voltage regulator, to transfer the bias current,

wherein the bias-generating device in the voltage regulator is a MOSFET device,

wherein the MOSFET device is a first p-type transistor having a drain coupled to the interconnect and the first p-type transistor having a source coupled to a voltage source,

wherein the voltage regulator includes:

a second p-type transistor having a gate coupled to a gate of the first p-type transistor and the second p-type transistor having a source coupled to the voltage source;

a third p-type transistor having a gate coupled to the gate of the second p-type transistor and the third p-type transistor having a source coupled to the voltage source;

a fourth p-type transistor having a gate coupled to the gate of the third p-type transistor and the fourth p-type transistor having a source coupled to the voltage source;

a fifth p-type transistor having a gate coupled to the gate of the fourth p-type transistor and the fifth p-type transistor having a source coupled to the voltage source;

a first n-type transistor having a drain coupled to a drain of the second p-type transistor, the first n-type transistor having a source coupled to ground and the first n-type transistor having a gate coupled to the drain of the second p-type transistor;

a second n-type transistor having a drain coupled to a drain of the third p-type transistor, the drain of the second n-type transistor coupled to the gate of the third p-type transistor and the gate of the fourth p-type transistor, the second n-type transistor having a gate coupled to an input, and the second n-type transistor having a source;

a third n-type transistor having a drain coupled to a drain of the fourth p-type transistor and a drain of the fifth p-type transistor, the third n-type transistor having a gate coupled to an output and the gate of the third n-type transistor coupled to the drain of the fourth p-type transistor and the drain of the fifth p-type transistor, and the third n-type transistor having a source; and,

a fourth n-type transistor having a drain coupled to the source of the second n-type transistor and the source of the third n-type transistor, the fourth n-type transistor having a source coupled to ground and the fourth n-type transistor having a gate coupled to the gate of the first n-type transistor and the drain of the first n-type transistor.

12)-23)(cancelled)

24) (previously presented) A circuit, comprising:

a first p-type transistor having a gate, the first p-type transistor having a drain to output a current proportional to an output current and the first p-type transistor having a source coupled to a voltage source;

a second p-type transistor having a gate coupled to the gate of the first p-type transistor and the second p-type transistor having a source coupled to the voltage source;

a third p-type transistor having a gate coupled to the gate of the second p-type transistor and the third p-type transistor having a source coupled to the voltage source;

a fourth p-type transistor having a gate coupled to the gate of the third p-type transistor and the fourth p-type transistor having a source coupled to the voltage source;

a fifth p-type transistor having a gate coupled to the gate of the fourth p-type transistor and a the fifth p-type transistor having a source coupled to the voltage source;

a first n-type transistor having a drain coupled to a drain of the second p-type transistor, the first n-type transistor having a source coupled to ground and the first n-type transistor having a gate coupled to the drain of the second p-type transistor;

a second n-type transistor having a drain coupled to a drain of the third p-type transistor, the drain of the second n-type transistor coupled to the gate of the third p-type transistor and the gate of the fourth p-type transistor, the second n-type transistor having a gate coupled to an input, and the second n-type transistor having a source;

a third n-type transistor having a drain coupled to a drain of the fourth p-type transistor and a drain of the fifth p-type transistor, the third n-type transistor having a gate coupled to an output and the gate of the third n-type transistor coupled to the drain of the fourth p-type transistor and the drain of the fifth p-type transistor, and the third n-type transistor having a source; and,

a fourth n-type transistor having a drain coupled to the source of the second n-type transistor and the source of the third n-type transistor, the fourth n-type transistor having a source coupled to ground and the fourth n-type transistor having a gate coupled to a gate of the first n-type transistor.

25) (previously presented) The circuit of claim 24, wherein the circuit is included in an operational amplifier to generate a buffered signal at the output in response to a signal at the input.

26)-37)(cancelled)